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DOCKET NO.: 03-SIN-092 (STMI01-03092)

PATENT

Customer No.: 30425

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of : Yuan Wu, et al.

U.S. Serial No. : 10/656,453

Filing Date : December 31, 2003

Title : APPARATUS AND METHOD FOR RENDERING AUDIO
INFORMATION TO VIRTUALIZE SPEAKERS IN AN
AUDIO SYSTEM

Examiner : Disler Paul

Group Art Unit : 2615

MAIL STOP PETITION

Commissioner of Patents

P.O. Box 1450

Alexandria, VA 22313-1450

CERTIFICATE OF MAILING BY FIRST CLASS MAIL

Sir:

The undersigned hereby certifies that the following documents:

1. Petition to Withdraw Holding of Abandonment;
2. Copy of Amendment Transmittal Letter, Amendment and Response to Office Action, Certificate of Mailing by First Class Mail, and check in the amount of \$1,050.00 for five (5) additional independent claims placed with the U.S. Postal Service on November 13, 2007;
3. Statement of Kathy Cedor;
4. Copy of User Detail Report; and
5. A postcard receipt

relating to the above application, were deposited as "First Class Mail" with the United States Postal Service, addressed to Mail Stop Petition, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on April 11, 2008.

Date: April 11, 2008

Date: April 11, 2008

P.O. Box 802432

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William A. Munck
Mailer

William A. Munck

Reg. No. 39,308

DOCKET NO.: 03-SIN-092 (STMI01-03092)
Customer No.: 30425

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of : Yuan Wu, et al.

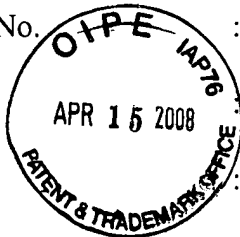
U.S. Serial No. : 10/656,453

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Title : APPARATUS AND METHOD FOR RENDERING AUDIO
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AUDIO SYSTEM

Examiner : Disler Paul

Group Art Unit : 2615



MAIL STOP PETITION

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

PETITION TO WITHDRAW HOLDING OF ABANDONMENT

In response to the Notice of Abandonment mailed March 20, 2008, Applicant submits this Petition.

An Amendment Transmittal Letter, Amendment and Response to Office Action and check in the amount of \$1,050.00 were mailed to the United States Patent and Trademark on November 13, 2007 in response to the Office Action mailed August 10, 2007. The Certificate of Mailing was signed by Kathy Cedor and the undersigned attorney of record, William A. Munck. A copy of the documents as filed are attached hereto.

Also attached hereto is an executed Statement of Kathy Cedor explaining the steps taken to

timely file the Amendment in the above-identified matter.

Finally attached hereto is a Detail Report indicating that copies were charged to matter number STMI01-03092 on November 13, 2007.

The entire delay in filing the required reply from the due date for the required reply until the filing of a grantable petition under 37 C.F.R. § 1.137(b) was unintentional.

Applicant respectfully requests that the holding of abandonment be withdrawn and the application be allowed to pass to issuance.

While no fee is believed to be due for the filing of this Petition, the Commissioner is authorized to charge any additional fees or credit any overpayment of fees due by virtue of this Petition to Deposit Account No. 50-0208.


If the Examiner requires any further assistance in this matter, the Applicant respectfully invites the Examiner to contact the undersigned at the telephone number indicated below or at wmunck@munckbutrus.com.

Respectfully submitted,

MUNCK BUTRUS CARTER, P.C.

Date: April 11, 2008

Docket Clerk
P.O. Box 802432
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Tel: (972) 628-3600
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William A. Munck
Registration No. 39,308

DOCKET NO.: 03-SIN-092 (STMI01-03092)
Customer No.: 30425

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In re Patent Application of : Yuan Wu, et al.
U.S. Serial No. : 10/656,453
Filing Date : December 31, 2003
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INFORMATION TO VIRTUALIZE SPEAKERS IN AN
AUDIO SYSTEM
Examiner : Disler Paul
Group Art Unit : 2615



MAIL STOP PETITION

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

STATEMENT OF KATHY CEDOR

I, Kathy Cedor, hereby attest on a personal knowledge basis to the timely mailing of the Amendment Transmittal Letter, Amendment and Response to Office Action, Certificate of Mailing by First Class Mail, and check in the amount of \$1,050.00 for five (5) additional independent claims on November 13, 2007, and make the following Statement in support of the Petition to Withdraw Holding of Abandonment:

In response to the Office Action dated August 10, 2007, I placed with the United States Postal Service the Amendment Transmittal Letter, Amendment and Response to Office Action, Certificate of Mailing by First Class Mail, check in the amount of \$1,050.00 for five (5) additional

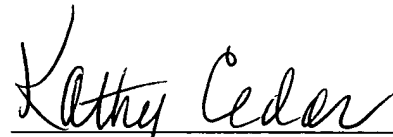
independent claims and return postcard, addressed to Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450. Copies of the executed paperwork are attached to the Petition to Withdraw Holding of Abandonment filed concurrently herewith.

Also attached hereto is a User Detail Report indicating that photocopies (\$19.40) were charged to STMI01-03092 on November 13, 2007.

Respectfully submitted,

MUNCK BUTRUS CARTER, P.C.

Date April 11, 2008


Kathy Cedor

DAVIS MUNCK, A PROFESSIONAL CORPORATION

ACCOUNT DETAIL REPORT

Date Range
From 11/13/07 0:00
To 11/13/07 23:59

Stmi01-03092 Stmicroelectronics Inc. / U.s. Patent Application

		Copy Transaction(s)			
User Name	Date	Time	Unit ID	Description	Size
Cedor Kelly	11/13/07	13:16	CFX02	Letter	
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					19.40
					19.40
					19.40

Totals For Stmi01-03092:





Mailed: November 13, 2007
In re. Application of: Yuan Wu, et al.
Serial No.: 10/656,453
Filed: September 5, 2003
Title: APPARATUS AND METHOD FOR RENDERING AUDIO
INFORMATION TO VIRTUALIZE SPEAKERS IN AN AUDIO
SYSTEM
Docket No.: 03-SIN-092 (STMI01-03092)

The following documents were received in the U.S. Patent and Trademark Office on the date stamped below:

- 1) Certificate of Mailing by First Class Mail;
- 2) Amendment Transmittal Letter (in duplicate);
- 3) Amendment and Response to Office Action; and
- 4) Check in the amount of \$1,050.00 for five (5) additional independent claims.

MUNCK BUTRUS, P.C. OPERATING ACCOUNT
A PROFESSIONAL CORPORATION

58504

VENDOR: Commissioner of Patents

11/12/2007 CHECK NO: 58504

OUR REF. NO.	YOUR INVOICE NUMBER	INVOICE DATE	INVOICE AMOUNT	AMOUNT PAID	DISCOUNT TAKEN
72234	STMI01-3092	11/12/2007	1050.00	1050.00	
	Amendment filing fee (five additional independent claims) (STMI01-3092)				

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\$1,050.00

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DALLAS, TEXAS 75240
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Commissioner of Patents
and Trademarks

TO THE
ORDER
OF

MUNCK BUTRUS, P.C.
A PROFESSIONAL CORPORATION
OPERATING ACCOUNT

MF



DOCKET NO. 03-SIN-092 (STMI01-03092)
Customer No. 30425

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of : Yuan Wu, et al.
U.S. Serial No. : 10/656,453
Filed : September 5, 2003
For : APPARATUS AND METHOD FOR RENDERING AUDIO
INFORMATION TO VIRTUALIZE SPEAKERS IN AN AUDIO
SYSTEM
Group No. : 2615
Examiner : Disler Paul

MAIL STOP AMENDMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

CERTIFICATE OF MAILING BY FIRST CLASS MAIL

Sir:

The undersigned hereby certifies that the following documents:

1. Amendment Transmittal Letter (in duplicate);
2. Amendment and Response to Office Action;
3. Check in the amount of \$1,050.00 for five (5) additional independent claims; and
4. A postcard receipt

relating to the above application, were deposited as "First Class Mail" with the United States Postal Service, addressed to MAIL STOP AMENDMENT, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on November 13, 2007.

Date: 11/13/07

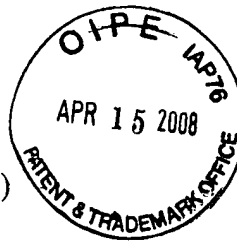
Kathy Cidon
Mailer

Date: Nov. 13, 2007

William A. Munck
William A. Munck
Reg. No. 39,308

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In re application of : Yuan Wu, et al.
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SYSTEM
Group No. : 2615
Examiner : Disler Paul

MAIL STOP AMENDMENT

Commissioner of Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

AMENDMENT TRANSMITTAL LETTER

Transmitted herewith is an Amendment and Response to Office Action in the above-identified application. The fee has been calculated as shown below.

CLAIMS AS AMENDED					LARGE ENTITY	
(1)	(2) CLAIMS REMAINING AFTER AMENDMENT	(3)	(4) HIGHEST NUMBER PREVIOUSLY PAID FOR	(5) NUMBER OF EXTRA CLAIMS PRESENT	(6) RATE	(7) ADDITIONAL FEE
TOTAL CLAIMS	27	-	32	-0-	X 50.00 =	\$-0-
IND. CLAIMS	9	-	4	5	X 210.00 =	\$1,050.00
TOTAL ADDITIONAL FEE FOR THIS AMENDMENT						\$1,050.00

DOCKET NO. 03-SIN-092 (STMI01-03092)
SERIAL NUMBER: 10/656,453
PATENT

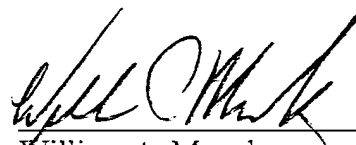
- ☒ A check in the amount of \$1,050.00 is attached for five (5) additional independent claims.
- ☐ A check in the amount of \$_____ for a _____-month extension of time is attached.
- ☒ Please charge any additional fees or credit any overpayment to the Munck Butrus Deposit Account No. 50-0208.

A DUPLICATE COPY OF THIS SHEET IS ENCLOSED.

Respectfully submitted,

MUNCK BUTRUS CARTER, P.C.

Date: Nov. 13, 2007



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Registration No. 39,308

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PATENT

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In re application of : Yuan Wu, et al.
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INFORMATION TO VIRTUALIZE SPEAKERS IN AN AUDIO
SYSTEM
Group No. : 2615
Examiner : Disler Paul

MAIL STOP AMENDMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

AMENDMENT AND RESPONSE TO OFFICE ACTION

No fees are believed to be necessary; however, in the event that any fees are required for the prosecution of this application, please charge any necessary fees to Deposit Account No. 50-0208. No extension of time is believed to be necessary. If, however, an extension of time is needed, the extension is requested and please charge the fee for this extension to Deposit Account No. 50-0208.

In response to the Office Action having a mailing date of August 10, 2007, please amend the above-identified application as follows:

AMENDMENTS TO THE CLAIMS:

1. (Canceled).

2. (Currently Amended) An audio processor, comprising:

a virtualizer operable to process audio information to virtualize at least one speaker so that, from a listener's perspective, sounds appear to come from at least one direction where a physical speaker is not present; and

a controller operable to configure the virtualizer, wherein the virtualizer can be configured to virtualize the at least one speaker at any location in a space around the listener, and ~~The audio processor of Claim 1;~~ wherein the virtualizer comprises:

a filter operable to filter input signals comprising the audio information;

a forward crossover path operable to receive, delay, and filter an output of the filter;

a first combiner operable to produce first output signals for a first physical speaker using the output of the filter;

a second combiner operable to produce second output signals for a second physical speaker using an output of the forward crossover path;

a first feedback crossover path operable to receive, delay, and filter the first output signals; the second combiner further operable to produce the second output signals using an output of the first feedback crossover path; and

a second feedback crossover path operable to receive, delay, and filter the second output signals, the first combiner further operable to produce the first output signals using an output of the second feedback crossover path.

3. (Currently Amended) An audio processor, comprising:

a virtualizer operable to process audio information to virtualize at least one speaker so that, from a listener's perspective, sounds appear to come from at least one direction where a physical speaker is not present; and

a controller operable to configure the virtualizer, wherein the virtualizer can be configured to virtualize the at least one speaker at any location in a space around the listener, and ~~The audio processor of Claim 1,~~ wherein the virtualizer comprises:

a plurality of filters operable to filter a plurality of input signals, the input signals comprising at least a portion of the audio information;

a plurality of forward crossover paths each operable to receive, delay, and filter an output from one of the filters;

one or more first combiners operable to produce first output signals for a first physical speaker using an output from at least one of the forward crossover paths and the output from at least one of the filters;

one or more second combiners operable to produce second output signals for a second physical speaker using an output from at least one other of the forward crossover paths and the output from at least one other of the filters;

a first feedback crossover path operable to receive, delay, and filter the first output signals, the one or more second combiners further operable to produce the second output signals using an output from the first feedback crossover path; and

a second feedback crossover path operable to receive, delay, and filter the second output signals, the one or more first combiners further operable to produce the first output signals using an output from the second feedback crossover path.

4. (Previously Presented) The audio processor of Claim 3, wherein:

the one or more first combiners are further operable to produce the first output signals using first unfiltered input signals; and

the one or more second combiners are further operable to produce the second output signals using second unfiltered input signals.

5. (Previously Presented) The audio processor of Claim 4, further comprising an attenuator operable to attenuate third unfiltered input signals;

wherein the one or more first combiners are further operable to produce the first output signals using the attenuated third input signals; and

wherein the one or more second combiners are further operable to produce the second output signals using the attenuated third input signals.

6. (Previously Presented) The audio processor of Claim 3, further comprising a plurality of additional filters each operable to filter one of first, second, and third additional input signals;

wherein the one or more first combiners are further operable to produce the first output signals using the filtered first additional input signals and the filtered third additional input signals; and

wherein the one or more second combiners are further operable to produce the second output signals using the filtered second additional input signals and the filtered third additional input signals.

7. (Currently Amended) An audio processor, comprising:

a virtualizer operable to process audio information to virtualize at least one speaker so that, from a listener's perspective, sounds appear to come from at least one direction where a physical speaker is not present;

a controller operable to configure the virtualizer, wherein the virtualizer can be configured to virtualize the at least one speaker at any location in a space around the listener;

and ~~The audio processor of Claim 1,~~ wherein:

the virtualizer comprises at least one first filter, one or more forward crossover paths each comprising a first delay line and a second filter, and two feedback crossover paths each comprising a second delay line and a third filter; and

the controller is operable to configure the virtualizer by altering a frequency response of one or more of the filters and a delay of one or more of the delay lines.

8. (Currently Amended) An audio processor, comprising:
a virtualizer operable to process audio information to virtualize at least one speaker so
that, from a listener's perspective, sounds appear to come from at least one direction where a
physical speaker is not present;
a controller operable to configure the virtualizer, wherein the virtualizer can be
configured to virtualize the at least one speaker at any location in a space around the listener;
and The audio processor of Claim 1, wherein:

the virtualizer comprises at least one first filter, one or more forward crossover paths each comprising a first delay line and a second filter, and two feedback crossover paths each comprising a second delay line and a third filter;

at least one first filter has a frequency response P of $|P| = \left| \frac{H_i(\phi)}{H_i(\theta)} \right|$,

at least one second filter has a frequency response F of $|F| = \left| \frac{H_c(\phi)}{H_i(\phi)} \right|$,

at least one third filter has a frequency response F_T of $|F_T| = \left| \frac{H_c(\theta)}{H_i(\theta)} \right|$,

at least one first delay line provides a delay D of $D = \tau(\phi) - \tau(F)$, and

at least one second delay line provides a delay D_T of $D_T = \tau(\theta) - \tau(F_T)$,

wherein θ represents an angle associated with at least one physical speaker, ϕ represents an angle associated with at least one virtualized speaker, H_i represents a transfer function associated with one of the listener's ears, H_c represents a transfer function associated with

another of the listener's ears, $t(\varphi)$ represents an inter-time difference associated with the at least one virtualized speaker, $t(\theta)$ represents an inter-time difference associated with the at least one physical speaker, $t(F)$ represents a delay associated with at least one second filter, and $t(F_7)$ represents a delay associated with at least one third filter.

9. (Currently Amended) An audio processor, comprising:

a virtualizer operable to process audio information to virtualize at least one speaker so that, from a listener's perspective, sounds appear to come from at least one direction where a physical speaker is not present;

a controller operable to configure the virtualizer, wherein the virtualizer can be configured to virtualize the at least one speaker at any location in a space around the listener; and

~~The audio processor of Claim 1, wherein:~~

the virtualizer comprises two first filters, two forward crossover paths each comprising a first delay line and a second filter, and two feedback crossover paths each comprising a second delay line and a third filter;

at least one first filter has a frequency response P_S of $|P_S| = \frac{|H_i(\phi)|}{|H_i(\theta)|}$,

at least one second filter has a frequency response F_S of $|F_S| = \frac{|H_c(\phi)|}{|H_i(\phi)|}$,

at least one third filter has a frequency response F_T of $|F_T| = \frac{|H_c(\theta)|}{|H_i(\theta)|}$,

at least one first delay line provides a delay D_S of $D_S = t(\phi) - t(F_S)$, and

at least one second delay line provides a delay D_T of $D_T = t(\theta) - t(F_T)$,

wherein θ represents an angle associated with two physical speakers, ϕ represents an angle associated with two virtualized speakers, H_i represents a transfer function associated with one of the listener's ears, H_c represents a transfer function associated with another of the listener's ears, $t(\phi)$ represents an inter-time difference associated with the two virtualized

speakers, $t(\theta)$ represents an inter-time difference associated with the two physical speakers, $t(F_S)$ represents a delay associated with at least one second filter, and $t(F_T)$ represents a delay associated with at least one third filter.

10. (Canceled).

11. (Currently Amended) A device, comprising:

an audio source operable to provide audio information; and

an audio processor operable to receive the audio information and process the audio information to virtualize at least one speaker so that, from a listener's perspective, sounds appear to come from at least one direction where a physical speaker is not present, the audio processor being configurable to virtualize the at least one speaker at any location in a space around the listener; and

wherein the audio processor comprises:

one or more filters operable to filter one or more input signals comprising at least a portion of the audio information;

one or more forward crossover paths each operable to receive, delay, and filter an output from one of the filters;

one or more first combiners operable to produce first output signals for a first physical speaker using one or more of: one or more of the input signals, one or more outputs from the filters, and one or more outputs from the forward crossover paths;

one or more second combiners operable to produce second output signals for a second physical speaker using one or more of: one or more of the input signals, one or more outputs from the filters, and one or more outputs from the forward crossover paths;

a first feedback crossover path operable to receive, delay, and filter the first output signals, the one or more second combiners further operable to produce the second output signals using an output from the first feedback crossover path; and

a second feedback crossover path operable to receive, delay, and filter the second output signals, the one or more first combiners further operable to produce the first output signals using an output from the second feedback crossover path.

12. (Canceled)

13. (Currently Amended) The device of Claim [[12]] 11, further comprising an attenuator operable to attenuate additional input signals;

wherein the one or more first combiners are further operable to produce the first output signals using the attenuated input signals; and

wherein the one or more second combiners are further operable to produce the second output signals using the attenuated input signals.

14. (Currently Amended) The device of Claim [[12]] 11, wherein:

each forward crossover path comprises a first delay line and a second filter;

each feedback crossover path comprises a second delay line and a third filter; and

the audio processor is configured by altering a frequency response of one or more of the filters and a delay of one or more of the delay lines.

15. (Previously Presented) The device of Claim 11, wherein the audio processor is operable to virtualize five speakers using two physical speakers.

16. (Previously Presented) The device of Claim 11, wherein the audio source comprises at least one of a television tuner, a radio tuner, a CD reader, and a DVD reader.

17. (Previously Presented) The device of Claim 11, wherein the audio source comprises an audio/video source operable to provide both audio and video information; and further comprising a video processor operable to process the video information.

18. (Previously Presented) An apparatus for virtualizing a speaker at a location in space, comprising:

one or more filters operable to filter one or more input signals comprising audio information;

one or more forward crossover paths each operable to receive, delay, and filter an output from one of the filters;

one or more first combiners operable to produce first output signals for a first physical speaker using one or more of: one or more of the input signals, one or more outputs from the filters, and one or more outputs from the forward crossover paths;

one or more second combiners operable to produce second output signals for a second physical speaker using one or more of: one or more of the input signals, one or more outputs from the filters, and one or more outputs from the forward crossover paths;

a first feedback crossover path operable to receive, delay, and filter the first output signals, the one or more second combiners further operable to produce the second output signals using an output from the first feedback crossover path; and

a second feedback crossover path operable to receive, delay, and filter the second output signals, the one or more first combiners further operable to produce the first output signals using an output from the second feedback crossover path.

19. (Previously Presented) The apparatus of Claim 18, further comprising an attenuator operable to attenuate additional input signals;

wherein the one or more first combiners are further operable to produce the first output signals using the attenuated input signals; and

wherein the one or more second combiners are further operable to produce the second output signals using the attenuated input signals.

20. (Previously Presented) The apparatus of Claim 18, wherein:

each forward crossover path comprises a first delay line and a second filter;

each feedback crossover path comprises a second delay line and a third filter; and

the apparatus is configured by altering a frequency response of one or more of the filters and a delay of one or more of the delay lines.

21. (Previously Presented) The apparatus of Claim 18, further comprising a controller operable to configure the apparatus.

22. (Previously Presented) The apparatus of Claim 21, wherein the controller is operable to configure the apparatus based at least partially on locations of two or more physical speakers and locations of the speakers being virtualized.

23. (Previously Presented) The apparatus of Claim 18, wherein the audio processor is operable to virtualize five speakers using two physical speakers, the five virtualized speakers comprising a center speaker, two frontal speakers, and two surround sound speakers.

24. (Previously Presented) The apparatus of Claim 18, wherein:

the one or more filters comprise at least one first filter;

the one or more forward crossover paths each comprises a first delay line and a second filter;

the feedback crossover paths each comprises a second delay line and a third filter;

at least one first filter has a frequency response P of $|P| = \left| \frac{H_i(\phi)}{H_i(\theta)} \right|$,

at least one second filter has a frequency response F of $|F| = \left| \frac{H_c(\phi)}{H_i(\phi)} \right|$,

at least one third filter has a frequency response F_T of $|F_T| = \left| \frac{H_c(\theta)}{H_i(\theta)} \right|$,

at least one first delay line provides a delay D of $D = t(\phi) - t(F)$, and

at least one second delay line provides a delay D_T of $D_T = t(\theta) - t(F_T)$,

wherein θ represents an angle associated with at least one physical speaker, ϕ represents an angle associated with at least one virtualized speaker, H_i represents a transfer function associated with one of the listener's ears, H_c represents a transfer function associated with another of the listener's ears, $t(\phi)$ represents an inter-time difference associated with the at least one virtualized speaker, $t(\theta)$ represents an inter-time difference associated with the at least one physical speaker, $t(F)$ represents a delay associated with at least one second filter, and $t(F_T)$ represents a delay associated with at least one third filter.

25. (Previously Presented) The apparatus of Claim 18, wherein:

the one or more filters comprise two first filters;

the one or more forward crossover paths comprise two forward crossover paths each comprising a first delay line and a second filter;

the feedback crossover paths each comprises a second delay line and a third filter;

at least one first filter has a frequency response P_S of $|P_S| = \left| \frac{H_i(\phi)}{H_i(\theta)} \right|$,

at least one second filter has a frequency response F_S of $|F_S| = \left| \frac{H_c(\phi)}{H_i(\phi)} \right|$,

at least one third filter has a frequency response F_T of $|F_T| = \left| \frac{H_c(\theta)}{H_i(\theta)} \right|$,

at least one first delay line provides a delay D_S of $D_S = t(\phi) - t(F_S)$, and

at least one second delay line provides a delay D_T of $D_T = t(\theta) - t(F_T)$,

wherein θ represents an angle associated with two physical speakers, ϕ represents an angle associated with two virtualized speakers, H_i represents a transfer function associated with one of the listener's ears, H_c represents a transfer function associated with another of the listener's ears, $t(\phi)$ represents an inter-time difference associated with the two virtualized speakers, $t(\theta)$ represents an inter-time difference associated with the two physical speakers, $t(F_S)$ represents a delay associated with at least one second filter, and $t(F_T)$ represents a delay associated with at least one third filter.

26. (Previously Presented) The apparatus of Claim 18, wherein:

the one or more filters comprise a first filter, two second filters, and two third filters;

the one or more forward crossover paths comprise two first forward crossover paths each comprising a first delay line and a fourth filter and two second forward crossover paths each comprising a second delay line and a fifth filter;

the feedback crossover paths each comprises a second delay line and a sixth filter;

at least one first filter has a frequency response P_C of $|P_C| = \left| \frac{H_i(0^\circ)}{H_i(\theta)} \right|$,

at least one second filter has a frequency response P_F of $|P_F| = \left| \frac{H_i(\omega)}{H_i(\theta)} \right|$,

at least one third filter has a frequency response P_S of $|P_S| = \left| \frac{H_i(\phi)}{H_i(\theta)} \right|$,

at least one fourth filter has a frequency response F_F of $|F_F| = \left| \frac{H_e(\omega)}{H_i(\omega)} \right|$,

at least one fifth filter has a frequency response F_S of $|F_S| = \left| \frac{H_e(\phi)}{H_i(\phi)} \right|$,

at least one sixth filter has a frequency response F_T of $|F_T| = \left| \frac{H_e(\theta)}{H_i(\theta)} \right|$,

at least one first delay line provides a delay D_F of $D_F = t(\omega) - t(F_F)$,

at least one second delay line provides a delay D_S of $D_S = t(\phi) - t(F_S)$, and

at least one third delay line provides a delay D_T of $D_T = t(\theta) - t(F_T)$;

wherein θ represents an angle associated with two physical speakers, ϕ represents an angle associated with two first virtualized speakers, ω represents an angle associated with

two second virtualized speakers, H_i represents a transfer function associated with one of the listener's ears, H_c represents a transfer function associated with another of the listener's ears, $t(\phi)$ represents an inter-time difference associated with the two first virtualized speakers, $t(\omega)$ represents an inter-time difference associated with the two second virtualized speakers, $t(\theta)$ represents an inter-time difference associated with the two physical speakers, $t(F_F)$ represents a delay associated with at least one fourth filter, $t(F_S)$ represents a delay associated with at least one fifth filter, and $t(F_7)$ represents a delay associated with at least one sixth filter.

27. (Currently Amended) A method, comprising:

generating first output signals for a first physical speaker; ~~and~~

generating second output signals for a second physical speaker;

filtering one or more input signals to produce one or more filtered input signals;

providing one or more of the filtered input signals to one or more forward crossover

paths; and

generating the first and second output signals using one or more of: one or more of the

input signals, one or more of the filtered input signals, and one or more outputs from the

forward crossover paths;

providing the second output signals to a first feedback crossover path operable to receive,

delay, and filter the second output signals; and

providing the first output signals to a second feedback crossover path operable to receive,

delay, and filter the first output signals;

wherein generating the first output signals further comprises using an output from the

second feedback crossover path;

wherein generating the second output signals further comprises using an output from the

first feedback crossover path; and

wherein the first output signals emulate effects of a virtual speaker on one ear of a listener, the second output signals emulate effects of the virtual speaker on another ear of the listener, and each of the output signals at least partially cancels crosstalk caused by the other output signals.

28. – 29. (Canceled).

30. (Currently Amended) The method of Claim ~~[[27]]~~ 32, wherein the first and second output signals emulate the effects of multiple virtual speakers on the ears of the listener.

31. (Currently Amended) The method of Claim ~~[[27]]~~ 32, wherein the first and second output signals emulate the effects of multiple virtual speakers at any locations in a space around the listener.

32. (Currently Amended) A method, comprising:

generating first output signals for a first physical speaker;

generating second output signals for a second physical speaker;

~~The method of Claim 31, wherein:~~

wherein the first and second output signals are produced using one or more first filters, one or more forward crossover paths each comprising a first delay line and a second filter, and two feedback crossover paths each comprising a second delay line and a third filter; and

further comprising altering a frequency response of one or more of the filters and a delay of one or more of the delay lines to change the location of one or more of the virtualized speakers.

REMARKS

Claims 1-32 are pending in the application.

Claims 18-26 have been allowed.

Claims 1, 11, 15-17, 27-28 and 30-31 have been rejected.

Claims 2-6, 7-10, 12-14 and 29-32 have been objected to.

Claims 2, 3, 7, 8, 9, 11, 13, 14, 27, 30, 31 and 32 have been amended, as set forth herein.

Claims 1, 10, 28 and 29 have been canceled, without prejudice.

I. ALLOWED AND ALLOWABLE CLAIMS

Applicant thanks the Examiner for the indication that Claims 18-26 are allowed and that Claims 2-6, 7-10, 12-14 and 29-32 would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim 1 has been canceled, without prejudice.

Claims 2 and 3 have been rewritten as independent claims.

Claims 7, 8 and 9 have been rewritten as independent claims.

Claim 10 has been canceled, without prejudice.

Independent Claim 11 has been amended to include the limitations of objected to Claim

12.

Claims 13 and 14 have been amended to depend from amended independent Claim 11.

Independent Claim 27 has been amended to include the limitations of objected to Claims 28 and 29.

Claim 32 has been rewritten as an independent claim, however, without the intervening limitation set forth in Claim 31.

Claims 30 and 31 have been amended to depend from now independent Claim 32.

II. REJECTIONS UNDER 35 U.S.C. § 102

Claims 1, 11, 16 and 17 were rejected under 35 U.S.C. § 102(e) as being anticipated by Hashimoto (US Patent Application Publication No. 2004/0032955). Claims 27-28 and 30-31 were rejected under 35 U.S.C. § 102(e) as being anticipated by Sotome (US Patent Application Publication No. 2003/0086572). The rejection is respectfully traversed.

A cited prior art reference anticipates the claimed invention under 35 U.S.C. § 102 only if every element of a claimed invention is identically shown in that single reference, arranged as they are in the claims. MPEP § 2131; *In re Bond*, 910 F.2d 831, 832, 15 U.S.P.Q.2d 1566, 1567 (Fed. Cir. 1990). Anticipation is only shown where each and every limitation of the claimed invention is found in a single cited prior art reference. MPEP § 2131; *In re Donohue*, 766 F.2d 531, 534, 226 U.S.P.Q. 619, 621 (Fed. Cir. 1985).

As noted above, independent Claim 1 has been canceled, without prejudice.

As noted above, independent Claim 11 has been amended to include the limitations set forth in dependent Claim 12 (allowable). Claims 16 and 17 depend from independent Claim 11. Therefore, Claims 11, 16 and 17 are now allowable.

As noted above, independent Claim 27 has been amended to include the limitations set forth in dependent Claims 28 and 29 (allowable). Therefore, Claim 27 is now allowable, and Claims 28 and 29 have been canceled.

As noted above, Claim 32 has been rewritten in independent form, except without adding the limitations of Claim 31; and Claims 30 and 31 have been amended to depend from independent Claim 32. Applicant respectfully submits that Claims 30, 31 and 32 are allowable.

Accordingly, the Applicant respectfully requests the Examiner withdraw the § 102(e) rejection of Claims 1, 11, 16, 17, 27-28 and 30-31.

III. REJECTION UNDER 35 U.S.C. § 103

Claim 15 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Hashimoto (US Patent Application Publication No. 2004/0032955) in view of Abel (US Patent No. 6,668,061). The rejection is respectfully traversed.

As noted above, independent Claim 11 has been amended to include the limitations set forth in dependent Claim 12 (allowable). Claim 15 depends from independent Claim 11. Therefore, Claim 15 is now allowable.

Accordingly, the Applicant respectfully requests withdrawal of the § 103(a) rejection of Claim 15.

IV. CONCLUSION

As a result of the foregoing, the Applicant asserts that the remaining Claims in the Application are in condition for allowance, and respectfully requests an early allowance of such Claims.

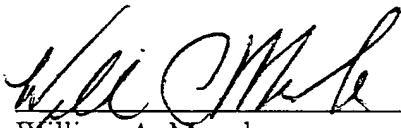
If any issues arise, or if the Examiner has any suggestions for expediting allowance of this Application, the Applicant respectfully invites the Examiner to contact the undersigned at the telephone number indicated below or at wmunck@munckbutrus.com.

The Commissioner is hereby authorized to charge any additional fees connected with this communication or credit any overpayment to Munck Butrus Deposit Account No. 50-0208.

Respectfully submitted,

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Date: Nov. 13, 2007



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